Contents

Tables

9. Category 3 Hazardous Materials

9.1 Introduction

LLNL has established policies to mitigate the risks from hazardous materials. This Section provides LLNL's containment, communication, and control policies and implementation requirements for on-site handling and transport of Category 3 Hazardous Materials. It identifies organizational responsibility and the hazards associated with the primary types of Category 3 Hazardous Materials. **Section 7** provides those requirements for Category 1 Hazardous Materials, and **Section 8** provides them for Category 2 Hazardous Materials.

9.2 Accountability

Materials Distribution Division

The Materials Distribution Division (MDD) has responsibility and authority for receiving and distributing Category 3 Hazardous Materials and provides explosives and other transportation support for both Site 300 and Main Site. MDD may also, on occasion, provide transportation services to HWM Division for transfer of Category 2 Hazardous Materials and to MMS for transfer of Category 1 Hazardous Materials.

9.3 Identification and Hazards of Category 3 Hazards Materials

Types of Category 3 Hazardous Materials

Category 3 Hazardous Materials include pressurized gases, polychlorinated biphenyls (PCBs), mercury and its compounds, acids, bases, and other toxic substances. Category 3 Hazardous Materials can fall into any DOT Hazard Class except radioactive materials or explosives. (See **Table 7-1** for DOT Hazard Classes references to 49 CFR.) The paragraphs below present more information on the hazards associated with various Category 3 Hazardous Materials.

Pressurized Gases

Pressurized gases can be flammable, toxic, corrosive, reactive, or cryogenic. A small spill can produce a large volume of gas which can displace air in a confined space.

Pressure vessels and cylinders are managed under the Hazards Control pressure safety program as described in the *LLNL Health and Safety Manual,* Chapter 32. Pressurized materials are transported in DOT containers adequately tied down to the transport vehicle.

LLNL uses its ChemTrack system to track vendor-owned cylinders on-site at the Laboratory. The Industrial Gases Group of MDD affixes barcodes to incoming cylinders and documents their initial delivery points at the Main Site and Site 300.

Polychlorinated Biphenyls (PCBs)

Contact with PCBs can cause skin irritation and/or acne-like cysts. Eye contact causes severe eye irritation. Smoke and mist from burning PCBs can cause respiratory irritation. PCBs are extremely persistent in the environment and tend to accumulate in food chains.

EPD tracks the location of PCBs on-site. PCBs are managed according to *LLNL Health and Safety Manual,* Supplement 21.17, "Safe Handling, Storage, and Disposal of Polychlorinated Biphenyls (PCBs)"

Mercury and Its Compounds

Metallic mercury vapor is readily absorbed from inhaled air and can also pass through intact skin. Chronic exposure will effect the nervous system. Some mercury salts can irritate the skin and cause kidney damage. Other mercury compounds can be explosive or oxidizers.

Mercury and compounds are managed according to *LLNL Health and Safety Manual,* Supplement 21.11, "Safe Handling of Mercury."

Acids and Bases

Acids and bases are corrosive and can cause burns on contact with the skin. Vapors, mists, and dusts, when inhaled, may cause irritation of the respiratory system and may be absorbed into the blood stream through the lungs. When mixed with other chemicals, severe reactions can occur.

Acids and bases are managed according to *LLNL Health and Safety Manual,* Supplement 221.15, "Safe Handling of Acids and Bases."

Other Toxic and Hazardous Materials

Other Category 3 Hazardous Materials may be classed as pyrophoric liquids, flammable solids, oxidizers, organic peroxides, poisons, irritating materials, or etiological agents and may have toxic properties. Toxic and hazardous materials are managed according to *LLNL Health and Safety*

Manual, Chapter 8, "Hazardous Material Control," and Chapter 11, "Chemicals."

9.4 Transport of Category 3 Hazardous Materials

Receiving and Transfer of Pressurized Gases

Pressurized gas cylinders arriving at either Main Site or at Site 300 are required to meet DOT requirements. Cylinders are delivered to the LLNL Industrial Gas area of MDD.

MDD transports gas cylinders to the user in the original DOT packages in MDD vehicles.

No repackaging or removal of labeling or markings is permitted.

Toxic gases are delivered within one day directly to the user who signs for release of the cylinder.

User Pickup of Gas Cylinders

As an alternative, the user may also pick up and transport Category 3 Hazardous Materials from the Industrial Gas area in a pickup truck. Cylinders must be adequately tied down before Industrial Gas personnel will allow users to transport the cylinders.

Empty Gas Cylinders

MDD picks up empty gas cylinders and transports them to the Industrial Gas Area for return to the vendor; or if the cylinder is LLNL-owned, MDD returns it to a vendor for to be refilled.

Cargo Tanks

Cargo tanks are used to transport gasoline, diesel fuel, and other hazardous liquids at the Main Site and at Site 300. Tank vessels are required to conform to DOT requirements on-site. Because no additional containment, communication, or controls are required, hazardous materials transported in tank vessels are not discussed below.

Receiving and Transport of Chemical, Alcohol, Oils, and Solvent Drums

Five-gal drums and 55-gal drums of chemicals, alcohol, oils, and solvents are delivered to the LLNL Industrial Gas area of MDD. Drums arriving at LLNL or at Site 300 are required to meet DOT requirements.

MDD transports these drums to the user in the original DOT packages in MDD vehicles. No repackaging or removal of labeling or markings is permitted. Damaged containers are repackaged in DOT-specification containers or other approved containers.

User Pickup of Drum Containers

The user may also pick up and transport drums of Category 3 Hazardous Materials from the Industrial Gas area in a pickup truck. Containers must be adequately secured before Industrial Gas personnel will allow users to transport Category 3 Hazardous Materials.

Receiving and Transfer of Packaged Chemicals

Category 3 Hazardous Material packages arriving at Main Site or at Site 300 are required to meet DOT requirements. Packages are delivered to the LLNL Receiving Group of MDD and are then load listed in the LLNL PARIS computer system.

MDD transports Category 3 Hazardous Materials to the user in the original DOT packages in MDD vehicles. No repackaging or removal of labeling or markings is permitted. Damaged containers are repackaged by MDD in DOT-Specification containers or other approved containers.

User Pickup of Packaged Materials

The user may pick up and transport Category 3 Hazardous Materials from the receiving area in a pickup truck. MDD insures that packages are adequately tied down.

Break-Bulk Transfers between LLNL Facilities

Category 3 Hazardous Materials in quantities greater than 1 gal are packaged and transferred between LLNL facilities in accordance with the controls in this plan, as provided in the *LLNL Health and Safety Manual,* and incorporated into individual Facility Safety Procedures (FSPs) and Operational Safety Procedures (OSPs) as written or revised. OSPs are reviewed every year and FSPs are reviewed every three years.

Research Quantities

Research quantities (quantities less than 1 gal) of Category 3 Hazardous Materials, unless otherwise specified, are handled, packaged, and transported in accordance with OSHA requirements and good management practices. Proper containment, communication, and controls must be provided to ensure safety during normal transport.

9.5 Containment, Communication, and Control Policies and Requirements for Pressurized Gases

Containment Policy for Pressurized Gases

Category 3 Hazardous Materials are contained and transported in accordance with federal, state, and local requirements.

Containment Requirements for Pressurized Gases

Pressurized gases are contained and transferred in DOT-specification cylinders or vessels. Nonconforming containers are not permitted on-site. Damaged or modified containers are disposed of as hazardous waste or sold as salvageable material.

Communication Policy for Pressurized Gases

Gas cylinders and vessels must be marked or labeled according to the appropriate hazard and in accordance with DOT regulations.

Communication Requirements for Pressurized Gases

DOT markings and labels are required on pressurized gas cylinders and vessels.

- Vendor-owned gas cylinders are barcoded and tracked internally by LLNL's ChemTrack system.
- Vehicles (except user vehicles) carrying compressed gas cylinders are placarded as per DOT requirements.
- Commonly used gas cylinders are color-coded for easy identification. **Table 9-1** lists the color codes for gas cylinders used at Main Site and Site 300.

Control Policy for Pressurized Gases

The use of trained and qualified material handlers greatly reduces the probability of personnel error that could lead to accidents.

Table 9-1. Color codes for gas cylinders[a].

Type of Gas	Cylinder Owner	Color Code
Acetylene	LLNL	Red
Compressed air	LLNL	Gray
Argon	LLNL	Brown
Carbon dioxide	Vendor	Silver
Carbon dioxide siphon	Vendor	Blue with yellow neck ring[b]
Helium	Vendor or LLNL	Gray with cream top
Hydrogen	LLNL	Red
Methane	LLNL	Aluminum with blue top
Nitrogen	LLNL	Black
Oxygen	LLNL	Green

[a] LLNL owned cylinders are stenciled "Property of LLNL" on a 12-in.-wide *yellow* band at the cylinder base.

[b] Carbon dioxide siphon cylinders for fire protection systems are painted red.

Control Requirements for Pressurized Gases

Stock gas cylinders are normally transported by truck. Large quantities are sometimes delivered to the users on a flatbed trailer. Refer to **Table 9-2** for other vehicles used to transport compressed gases.

The following administrative and/or physical controls are in effect to mitigate risk during transport of pressurized gas cylinders or vessels:

- Gas cylinders must be secured to the side rails in an upright position.
- Packages shall not be lifted or transported higher than 4 ft above the ground, unless authorized.
- While transferring Category 3 Hazardous Materials, drivers must not exceed a 40-km/h (25-mph) speed limit at LLNL and a 56-km/h (35-mph) speed limit at Site 300.
- The user may transport quantities of gas cylinders in a pickup truck, provided the cylinders are tied down.
- The LLNL Fire Department must be able to respond to any emergency at the Main Site within 3 minutes.
- The LLNL Fire Department must be able to respond to any emergency at Site 300 within 15 minutes.

Table 9-2. MDD vehicles.

Vehicle type	On-Site Transport Use for Category 3 Hazardous Materials
Semis	Toxic gas cylinders, 55-gal drums, safety cans
Flatbed truck	Stock gas cylinders
Flatbed trailers	55-gal drums, DOT-specification packages, safety cans, stock gas cylinders, hazardous waste
Pickup	5-gal safety cans, gas cylinders
MDD RDS Vans	Hazardous materials in DOT-approved packaging

9.6 Containment, Communication, and Control Policies and Requirements for Flammable and Combustible Liquids

Containment Policy for Flammable and Combustible Liquids

Category 3 Hazardous Materials are contained and transported in accordance with federal, state, and local requirements.

Containment Requirements for Flammable and Combustible Liquids

Flammable and combustible liquids can be transported in either DOT-specification 55-gal drums, DOT 5-gal drums, or LLNL-approved 5-gal safety cans or other DOT-approved containers.

Communication Policy for Flammable and Combustible Liquids

Packages are marked or labeled according to the appropriate hazard, and vehicles (except user vehicles) are placarded in accordance with DOT regulations.

Communication Requirements for Flammable and Combustible Liquids

Flammable and combustible liquids must be labeled during transport as follows:

- DOT-specification containers that are delivered to the user by Receiving or from Industrial Gases are labeled using DOT labels.
- DOT packages and/or safety cans are labeled, “For Flammable Liquids Only.”
- Ethyl alcohol must be labeled with an ethyl alcohol label.

- Vehicles (except user vehicles) carrying flammable and combustible liquids are placarded as per DOT requirements.

Control Policy for Flammable and Combustible Liquids

The use of trained and qualified material handlers greatly reduces the probability of personnel error that could lead to accidents.

Control Requirements for Flammable and Combustible Liquids

Flammable and combustible liquids are delivered to the users on MDD vehicles.

The following administrative and/or physical controls are in effect to mitigate risk during transport:

- The user may only handcarry quantities less than 1 gal.
- The user may transport quantities greater than 1 gal in safety cans, but the cans must be tied down to a truck bed.
- Packages shall not be lifted or transported higher than 4 ft above the ground, unless authorized.
- Drivers must not exceed a 40-km/h (25-mph) onsite speed limit at Main Site and a 56-km/h (35-mph) speed limit at Site 300 while transporting Category 2 Hazardous Materials.
- The LLNL Fire Department must be able to respond to any emergency at the Main Site within 3 minutes.
- The LLNL Fire Department must be able to respond to any emergency at Site 300 within 15 minutes.

9.7 Containment, Communication, and Control Policies and Requirements for Polychlorinated Biphenyls (PCBs)

Containment Policy for PCBs

Category 3 Hazardous Materials are contained and transported in accordance with federal, state, and local requirements.

Containment Requirements for PCBs

- Leaking containers must be drained, then repackaged in a secondary container such as a drum.
- PCBs and PCB-containing equipment must be transported in sealed containers to prevent leakage to the environment.

Note: A capacitor or transformer which is not leaking is considered an acceptable container.

Communication Policy for PCBs

Packages are marked or labeled according to the appropriate hazard, and vehicles (except user vehicles) are placarded in accordance with DOT regulations.

Communication Requirements for PCBs

Equipment containing PCBs are labeled with an LLNL PCB Label.

A CMID tag prepared by the Hazards Control technician assigned to the operational area must also be used whenever PCB-containing materials are transferred on-site.

Vehicles are placarded in accordance with DOT regulations.

Control Policy for PCBs

The use of trained and qualified material handlers greatly reduces the probability of personnel error that could lead to accidents.

Control Requirements for PCBs

The following administrative and/or physical controls are in effect to mitigate risk during on-site transport:

- The user may transport PCB materials in a pickup truck, provided the PCBs are not intended for waste, the containers are leak-tight, and they are adequately tied down.
- Packages shall not be lifted or transported higher than 4 ft above the ground, unless authorized.
- Drivers must not exceed a 40-km/h (25-mph) onsite speed limit at LLNL and a 56-km/h (35-mph) speed limit at Site 300 while transferring Category 2 Hazardous Materials.
- The LLNL Fire Department must be able to respond to any emergency at the Main Site within 3 minutes.
- The LLNL Fire Department must be able to respond to any emergency at Site 300 within 15 minutes.

9.8 Containment, Communication, and Control Policies and Requirements for Mercury and Its Compounds

Containment Policy for Mercury and Its Compounds

Category 3 hazardous materials are contained and transported in accordance with federal, state, and local requirements.

Containment Requirements for Mercury and Its Compounds

Mercury and its compounds must be transported in either DOT-specification containers or sealed, double-contained, impact-resistant containers, regardless of the amount.

The outer containers should be filled with packing, such as Kimpack or bubble pack. Sweeping compounds may be used as packing material if oil or other contaminants are also present.

Communication Policy for Mercury and Its Compounds

Packages are marked or labeled according to the appropriate hazard and vehicles (except user vehicles) are placarded in accordance with DOT regulations.

Communication Requirements for Mercury and Its Compounds

DOT-specification containers delivered to the user from Receiving are labeled using DOT labels.

Regardless of the amount, a "Mercury" label must be affixed to each container.

Vehicles (except user vehicles) are placarded in accordance with DOT regulations.

Control Policy for Mercury and Its Compounds

The use of trained and qualified material handlers greatly reduces the probability of personnel error that could lead to accidents.

Control Requirements for Mercury and Its Compounds

The following administrative and/or physical controls are in effect to mitigate risk during on-site transport:

- The user may only handcarry quantities less than 1 gal.
- The user may transport quantities greater than 1 gal, but the containers must be tied down to a truck bed.

- Packages shall not be lifted or transported higher than 4 ft above the ground, unless authorized.
- Drivers must not exceed a 40-km/h (25-mph) onsite speed limit at LLNL and a 56-km/h (35-mph) speed limit at Site 300 while transferring Category 2 Hazardous Materials.
- The LLNL Fire Department must be able to respond to any emergency at the Main Site within 3 minutes.
- The LLNL Fire Department must be able to respond to any emergency at Site 300 within 15 minutes.
- MDD vehicles are used to deliver mercury and its compounds to the users.
- The user may handcarry or transport small quantities of mercury and its compounds in pickup trucks or in LLNL Kushman carts as long as proper containment and communication controls are adhered to.

9.9 Containment, Communication, and Control Policies and Requirements for Acids and Bases

Containment Policy for Acids and Bases

Category 3 hazardous materials are contained and transported in accordance with federal, state, and local requirements.

Containment Requirements for Acids and Bases

Acids and bases are delivered to the users in bulk DOT containers or DOT-specification containers on MDD vehicles. Bulk containers meet DOT requirements.

The user may transport research quantities (1 gal or less) of materials provided the containers are adequate for normal transport and are adequately labeled.

Communication Policy for Acids and Bases

Packages are marked or labeled according to the appropriate hazard and vehicles (except user vehicles) are placarded in accordance with DOT regulations.

Communication Requirements for Acids and Bases

DOT-specification containers delivered to the user from Receiving or Industrial Gases are labeled using DOT labels.

Materials not labeled with DOT labels and markings must have either the original manufacturer's label or the chemical name and strength, and approximate hazard classification affixed to the container.

Vehicles (except user vehicles) are placarded in accordance with DOT regulations.

Control Policy for Acids and Bases

The use of trained and qualified material handlers greatly reduces the probability of personnel error that could lead to accidents.

Control Requirements for Acids and Bases

The following administrative and/or physical controls which serve to mitigate risk during on-site transport are also in effect:

- The user may only handcarry quantities less than 1 gal.
- The user may transport quantities greater than 1 gal, but these must be tied down to a truck bed.
- Packages shall not be lifted or transported higher than 4 ft above the ground, unless authorized.
- Drivers must not exceed a 40-km/h (25-mph) onsite speed limit at LLNL and a 56-km/h (35-mph) speed limit at Site 300 while transferring Category 2 Hazardous Materials.
- The LLNL Fire Department is able to respond to any emergency at the Main Site within 3 minutes.
- The LLNL Fire Department is able to respond to any emergency at Site 300 within 15 minutes.

9.10 Containment, Communication, and Control Policies and Requirements for Other Category 3 Hazardous Materials

Containment Policy for Other Category 3 Hazardous Materials

Category 3 hazardous materials are contained and transported in accordance with federal, state, and local requirements.

Containment Requirements for Other Category 3 Hazardous Materials

Other toxic and hazardous materials are delivered to the users in DOT-Specification containers on MDD vehicles. Research quantities (1 gal or less) of other Category 3 hazardous materials may be transported in non-DOT-Specification containers in the user's pickup trucks provided the containers are adequate for normal transport and are adequately labeled.

Communication Policy for Other Category 3 Hazardous Materials

Packages are marked or labeled according to the appropriate hazard and vehicles (except user vehicles) are placarded in accordance with DOT regulations.

Communication Requirements for Other Category 3 Hazardous Materials

DOT-specification containers delivered to the user from Receiving or Industrial Gases are labeled using DOT labels. Materials not labeled with DOT labels and markings must have either the original manufacturer's label or the chemical name and approximate hazard label (DANGER, WARNING, CAUTION) affixed to the container.

Control Policy for Other Category 3 Hazardous Materials

The use of trained and qualified material handlers greatly reduces the probability of personnel error that could lead to accidents.

Control Requirements for Other Category 3 Hazardous Materials

The following administrative and/or physical controls are in effect to mitigate risk during on-site transport:

- The user may only handcarry quantities less than 1 gal.
- The user may transport quantities greater than 1 gal, but these must be tied down to a truck bed.
- Packages shall not be lifted or transported higher than 4 ft above the ground, unless authorized.
- Drivers must not exceed a 40-km/h (25-mph) onsite speed limit at LLNL and a 56-km/h (35-mph) speed limit at Site 300 while transferring Category 2 Hazardous Materials.
- The LLNL Fire Department must be able to respond to any emergency at the Main Site within 3 minutes.
- The LLNL Fire Department must be able to respond to any emergency at Site 300 within 15 minutes.

Index to Section 9